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# Incubator-Induced Business Clusters: A Case Study

Bailey Tarpley  
*Pace University*

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Running head: Incubator-Induced Business Clusters: A Case Study

Incubator-Induced Business Clusters: A Case Study

Bailey Tarpley

bt46410n@pace.edu

International Management Major

Pace University

Lubin School of Business

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Andrew Coggins, PhD, Advisor

## Abstract

Incubator-induced business clusters are a new tool for governments wishing to economically revitalize geographic areas. However, this case study argues that the successful formation of a cluster through the use of a business incubator requires the presence of three important “cluster factors”: 1) resource dependence and integration of the four key players of a cluster 2) human capital aspects and 3) external intervention mechanisms aimed toward the creation of a cluster. The historical founding of Hollywood will be examined for these factors as well as the DUMBO incubator located in NYC. This case study will examine whether the situation in DUMBO will lend itself toward the successful formation of a technology cluster in that area.

**Table of Contents**

**I. Introduction ..... 4-5**

**II. Literature Review ..... 6-14**

    STRATEGIC ALLIANCES ..... 6-7

    BUSINESS CONSORTIA ..... 7-8

    BUSINESS CLUSTERS ..... 8-12

    BUSINESS INCUBATORS ..... 12-14

**III. Hollywood’s Cluster ..... 15-18**

**IV. DUMBO’s Incubator ..... 19-26**

    FOUR KEY PLAYERS ..... 19-24

*Research Community* ..... 19-21

*Entrepreneurs and Investors* ..... 21-22

*Economic Developers* ..... 22-23

*Educators and Workforce Development Training Organizations* ..... 23-24

    HUMAN CAPITAL ..... 24-26

    EXTERNAL INTERVENTION MECHANISMS ..... 26

**V. Conclusion ..... 27**

**VI. Appendix A ..... 28-29**

**VII. References ..... 30-31**

## I. Introduction

Strategic alliances have been formed by businesses for centuries. Many different types of strategic alliances have evolved to become part of the business world. Consortia, one type of strategic alliance between institutions that is aimed at accomplishing a mutual goal, have recently been used as a model through which to create business incubators. Incubators aid startup businesses when they are at their most vulnerable stage. Often, the ultimate goal of a consortium investing in a business incubator is to create a specific business cluster (Maher, 2014). In the past, business clusters like Hollywood were left to chance to form on their own because of the laissez-faire style of capitalism that existed in the beginning of the 20<sup>th</sup> century. However, recent initiatives by governments and private institutions attempt to create incubator-induced business clusters by developing their incubators “around a specific industry cluster, such as energy or food” (Maher, 2014). This paper argues that three “cluster factors” must be present for a cluster to develop, remain in the same geographic location, and sustain the operations in the same industry of the clustered businesses:

- 1) Resource dependence and integration of the four key players in a cluster (This includes the research community, entrepreneurs and investors, economic developers, and educators and workforce development training organizations.) which requires both a) an awareness of their resources and b) a consensus of their goals and aims
- 2) A cluster developed around a human capital intensive industry located in an area that provides and cultivates that specific type of human capital
- 3) External intervention by institutions wishing to see the cluster succeed

These cluster factors will be applied to the examination of the history of the formation of the film industry cluster in Hollywood as well as New York City’s DUMBO incubator. Formed by a consortium between the New York City Economic Development Corporation (NYCEDC), Two

Trees Management, and New York University's Polytechnic Institute (NYU-Poly), this incubator is designed to create a business cluster in the technology industry in this geographic area. By providing incentives such as reduced real estate taxes, relocation assistance, energy discounts, capital investment tax discounts, and more, these institutions attempt to create strong, interconnected incubator graduates in DUMBO to form a cluster. This is done under the assumption that once businesses leave or graduate from the business incubator, they will stay in the same geographic area, continue to operate within the same industry, and provide the needed economic benefits to the area. The assumption that business incubators always create sustainable business clusters once the companies graduate is unsubstantiated. The numerous factors that lead to the development and sustainability of business clusters may not be present in the environments that governments are investing in. This case study will explore the cluster factors leading to the creation, growth, and sustainability of clusters and apply these factors to the historical formation of Hollywood's film industry as well as the business incubator in New York City's DUMBO neighborhood to examine the likelihood that the business incubator will create a successful and sustainable business cluster once the incubator companies graduate.

## II. Literature Review

This literature review will define and distinguish between strategic alliances, consortia, business clusters, and business incubators. Histories, meanings, conditions of formation, and implications of each of the strategic business situations will be explored. Each of these strategic business situations will be used to examine the business cluster in Hollywood as well as the business incubator in New York City's DUMBO neighborhood.

### Strategic Alliances

Strategic alliances are not a new business strategy. For thousands of years, businesses have worked cohesively towards achieving mutual or independent goals. Widely defined as “an agreement between firms to do business together in ways that go beyond normal company-to-company dealings, but [falling] short of a merger or a full partnership,” strategic alliances “develop from an ecology of cooperation” between individual organizations and collectives (Barnett, Mischke, & Ocasio, 2000; Wheelen & Hungar, 2000). Ranging from trade associations to joint ventures, strategic alliances “can be effective ways to diffuse new technologies rapidly, to enter a new market, to bypass governmental restrictions expeditiously, and to learn quickly from the leading firms in a given field” (Elmuti & Kathawaia, 2001). The benefits of strategic alliances are numerous and vary depending on the type of alliance a group of firms is engaging in. Although the exact reason *why* companies form these relations in general is debated, one accepted explanation of the logic behind alliance formation is the existence of “strategic needs and social opportunities” for firms (Eisenhardt & Schoonhoven, 1996). Firms may engage in strategic alliances to fulfill a need or to access an opportunity such as another firm's resources or industry knowledge. When strategic alliances are formed, the fates of the cooperating organizations become linked and form, grow, and fail all together (Barnett, Mischke, & Ocasio, 2000). Although the possibility of failure exists, strategic alliances, when successful, allow

organizations to attain “goals that are unachievable by organizations independently” while diffusing the risks and effects of failure if it does occur (van de Ven, 1976). As one source explains, “Strategic alliances are partnerships of two or more corporations or business units that work together to achieve strategically significant objectives that are mutually beneficial” (Elmuti & Kathawaia, 2001). These partnerships, with great potential benefits for both parties, are gaining in popularity and “becoming more and more prominent in the global economy” (Elmuti & Kathawaia, 2001). This suggests that more and more firms are recognizing the benefits that strategic alliances can provide to their firms. One type of strategic alliance, consortia, are just one of many ways that companies can pool their resources today.

#### Business Consortia

Business consortia are groups of businesses aimed at accomplishing a mutual goal between multiple organizations while allowing the businesses to remain independent of the others (American Heritage Dictionary of the English Language, Fifth Edition, 2011). As explained by the UN:

“Most consortia are non-profit entities, and members retain their financial, legal, managerial, and commercial autonomy. So, despite their participation in the...consortia, member firms do not give up any control over their business to others. This is the main difference between consortia and other types of strategic alliances” (UNIDO, 2015).

This is an attribute that has made consortia increasingly popular among organizations wishing to engage in a strategic alliance. Consortia are formed to “play roles in developing new technologies, setting standards or norms, or generating interoperability parameters” between the organizations (Eisner, Rahman, & Korn, 2009). They are also formed to increase influence, save time and/or money, expand customer bases, or for R&D (Inc, 2015). No matter the consortia activity that leads to formation, consortia exist mainly between small companies so that they may

“leverage larger and broader influence and expertise” through their utilization of the resources of the other member firms (Bellis, Lawless, & et. al, 2001). Consortia, like most strategic alliances, allow companies to benefit while diffusing and mitigating risk throughout multiple organizations. Due to the costs and risks of a company engaging in consortia activities such as R&D alone, certain industries, such as the technology industry, have benefitted immensely from consortia (Smith Ring, Doz, & Olk, 2005). In the technology industry, the ability for firms to share in the costs of R&D, workforce development, and many other consortia activities allows them to free up more of their resources for other business operations while simultaneously providing them access to the other members’ resources (Smith Ring, Doz, & Olk, 2005). Technology consortia also “join together to set standards to enable the development of new infrastructures, products, and services” (Updegrove, 2002). All of these risk sharing activities have allowed technology consortia to become extremely successful in developing clusters in areas such as Silicon Valley. When joint groupings and efforts by consortia allow businesses to share resources with other firms while simultaneously freeing up their own resources for other uses, productivity and strength of the individual members increase.

### Business Clusters

Another type of strategic alliance, business clusters, are “a group of firms, and related economic actors and institutions, that are located near one another and that draw productive advantage from their mutual proximity and connections” (Cortright, 2003). Clusters differ from consortia because they are a naturally occurring phenomena that traditionally develop under specific economic and industry conditions instead of by active choice and contribution by member firms. For example, Silicon Valley is a cluster of technology firms that share the same human capital, suppliers, producers, etcetera. These connections form a support network for a specific industry. It is a company’s choice to join a consortium but simply operating in a certain

industry within a certain area automatically makes a business part of a cluster. Clusters form when industries become attracted to a certain area due to specific conditions in the marketplace. One argument explains that “a combination of geographic and natural resources [that are] exploited by local investors and entrepreneurs” leads to the formation of clusters (Walshok, 2009). This can be seen in the example of Hollywood’s development due to the creation of the Motion Picture Patents Company, also called the Trust, by Thomas Edison in 1909 (Edidin, 2005). The cluster grew and expanded very rapidly. This is due to the fact that once a group of businesses in a specific industry start to cluster, the snowball effect takes over and the cluster becomes more and more attractive to join. This is the point when a cluster has reached its critical mass. Sometimes the cluster will reach such a large critical mass that makes it a vitally important epicenter for an industry. This requires continuous long-term growth of the cluster. Formation, growth, and sustainability of a cluster requires very specific conditions. One theory claims that “good clusters offer their inhabitants two things: knowledge and capital” to keep them together (The Economist, 1999). Another theory claims that putting knowledge and capital to use in sustaining a cluster requires four key players: the research community, entrepreneurs and investors, economic developers, and educators and work force training organizations (Walshok, 2009). In this model, the knowledge comes from the research community, entrepreneurs, educators, and work force training organizations (Walshok, 2009). The investors, economic developers, and sometimes entrepreneurs themselves are the sources of capital (Walshok, 2009). These “key players” must collaborate and integrate in order to form and sustain the cluster (Walshok, 2009). The “community networks” formed by these players “have been largely responsible for the robustness and success of ... clusters” (Walshok, 2009). Most theories include the element of resource dependence and/or integration as a fundamental element of inter-organizational relations that leads to these “community networks” (Elmuti & Kathawaia, 2001;

van de Ven, 1976; Eisenhardt & Schoonhoven, 1996; Smith Ring, Doz, & Olk, 2005; Barnett, Mischke, & Ocasio, 2000; Walshok, 2009). Without this dependence and integration by these groups, clusters would not develop or survive. Two main models that explain why companies maintain relations with one another are the resource dependence model and the system change model (van de Ven, 1976). The resource dependence model explains that “if organizations were self-sustaining entities, there would be little need for inter-organization analysis. Therefore it is hypothesized that the greater the resource dependence, the more organizations will engage in communications with other agencies which may lead to establishing a relationship” (van de Ven, 1976). This is exactly what occurs and can be observed in business clusters. These relationships require first, an awareness of the resources and second, a consensus of the goals of the parties (van de Ven, 1976). Van de Ven explains, “the more successful each agency is in establishing awareness and consensus on the part of other agencies on joint and self-interest objectives, the greater the potential for [inter-organizational relationships] to emerge” (van de Ven, 1976). Clusters must establish this awareness of resource dependence and consensus of goals or they will fall apart. Without awareness, the benefits integration and knowledge sharing will not develop. Companies must also create a consensus of their goals or the cluster will be ripped apart by the divergence. The system change model argues that “external intervention stimulates inter-agency communications<sup>1</sup>” (van de Ven, 1976). When neutral third parties intervene, they are better able to facilitate communication and relationships in general between the other parties. Clusters can also be formed by consortia alliances due to the fact that consortia build reliance between companies for certain resources. Reliance between firms is an essential element for the formation and perpetuation of a cluster. A human capital based theory explains clusters by arguing that “industries cluster because human beings cluster” (McRae, 1998). McRae explains,

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<sup>1</sup> This can clearly be seen in incubators, which will be discussed in the next section.

“Financial capital can move anywhere in a few nanoseconds; physical capital, plant and machinery, can be built almost anywhere but human capital tends to stick in one place” (McRae, 1998). Certain industries require more human capital than others. For example, the movie industry and the technology industry both require highly specialized human capital in order to function. Clusters in these industries in particular become fundamentally much stronger because humans are unlikely to move en masse. Once a human capital-intensive industry cluster reaches its critical mass, “it becomes very difficult to dislodge” (McRae, 1998). However, the industry not only needs to be a human capital-intensive one but also must exist in an area that provides that type of human capital needed. This can often times be achieved through the creation of research and educational institutions that attract the right kind of human capital needed to a certain area. The car manufacturing industry cluster in Detroit was destroyed because it was not a “people business” that relied heavily enough on human capital to make it less mobile (McRae, 1998). Clusters that have reached a “critical mass” are the “foundation of a regional economy,” which makes them indispensable in order for a regional economy to prosper (Cortright, 2003; McRae, 1998). In order to create the connections necessary for the formation and perpetuation of a cluster, the four key players<sup>2</sup> of an industry must be operating in a human capital intensive industry while creating resource dependence and integration among firms through the use of external intervention to reach the critical mass necessary for the cluster to become stable, powerful and nearly impossible to dislodge. The governments that wish to create clusters through the use of business incubators must ensure that these cluster factors exist in order to be successful with reaching their goals.

#### Business Incubators

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<sup>2</sup> This includes the research community, entrepreneurs and investors, economic developers, and educators and work force training organizations identified by Walshok.

A unique type of consortia can be seen in business incubators. The term “incubator” was coined by Joe Mancuso in 1956 when he created the incubation business model (NBIA, 2015). After an 850,000 square-foot factory closed in Batavia, New York, the Mancuso family purchased the space to help revive the damaged local economy (NBIA, 2015). Unable to find a single company that would rent the space, Mancuso divided the building and rented out the separated parts while providing “shared office services, assistance with raising capital, and business advice” (NBIA, 2015). Because one of the renters was a chicken company, the space was given the nickname “incubator,” a name that stuck for this type of business model (NBIA, 2015). Business incubation “describes the cohabitation and cultivation of entrepreneurship through the offering of technical, location, and financial assistance for embryonic and early-stage businesses” (Cofield, 2011). Incubators today are consortia of business firms, government institutions, and sometimes even academic institutions that join together to revamp and revitalize local economies at the urging of the government institutions (NYU School of Engineering, 2015). These incubator consortium members provide support such as reduced rent, real estate taxes, relocation assistance, energy discounts, capital investment tax discounts, and more while providing access to markets, capital, research, and talent to help these startups (NYU School of Engineering, 2015). Incubators provide some of the same benefits as business consortia: risk sharing activities and increased access to more internal and external resources. Companies in an incubator have access to these resources and benefits until they graduate. Companies graduate when they indicate a level of maturity (Elkin, 2013). In some cases “maturity” could mean when the company “closes its first major round of financing, or when it outgrows the space” (Elkin, 2013). Typically initiated by governments, incubators have been a proven cost-effective way for governments to create jobs. In a study on the economic impact of federal investment, business incubators were found to create the most amount of jobs per dollar when compared to

infrastructure projects, transportation projects, and commercial structure projects (Arena, Adams, Noyes, Rhody, & Noonan, 2008). Business incubators are proven job creators but their long-term economic impact is unknown. Once incubator companies graduate, they must continue to operate in the same geographic location and in the same industry in order to continue to support and sustain the cluster that these incubators aim to create. If an incubator leads to the successful formation of a cluster that has the tools it needs to be sustained, then its long-term economic impact would be beneficial. However, the inability of an incubator to create a sustainable cluster would be a waste of resources for the people and institutions involved. Incubators are often developed “around a specific industry cluster,” such as technology (Maher, 2014). In fact, the largest focus of incubators is in the technology industry with “more than 37% of all incubators established to cultivate [the technology] sector” (Cofield, 2011). Initially incubators started as a way to support small businesses entrepreneurs during the start-up phase, but they are now being used as a means to create business clusters for long-term economic benefits to a specific geographic area. (Maher, 2014). The initiative is based on the idea that “cluster-focused incubators help to create a critical mass of interconnected businesses, thereby helping local clusters thrive” (Maher, 2014). In order for clusters to be successfully created in this manner, public and private institutions must artificially induce the conditions under which clusters thrive, most importantly by creating resource dependence through awareness and consensus in accordance with the resource dependence model and by focusing on an industry that is human capital intensive while also ensuring that there is that human capital readily available in the incubator and cluster area (van de Ven, 1976). The simple fact that incubators are by definition an external intervention mechanism makes the cluster much stronger, according to the system change model (van de Ven, 1976). It is the job of the institutions that support business incubators to ensure that the startup companies are given the tools they need to sustain the cluster once they

graduate. The cluster factors identified must be present otherwise the companies will not have any incentive to stay in that geographic location and the local governments run the risk of losing their incubator graduates to clusters that have already reached an independent critical mass strong enough to independently attract industry players. It is also a possibility that with the lack of cluster factors present, companies may switch industries, further destroying the cluster. If municipalities are able to develop, support, and contain the cluster, they will see the economic benefits for their local economies for an extended period of time.

### III. Hollywood's Cluster

There have been many clusters all over the world that have developed due to a unique set of circumstances. A special case can be observed in the formation of the film industry cluster in Hollywood. Before the Great Depression, Americans had a laissez-faire attitude toward business and capitalism in general. This makes Hollywood an interesting cluster case because it formed completely organically in the beginning with no intervention by the government before 1915. This serves as a great contrast to the incubator-induced business clusters that are being formed by governments now, one hundred years later. Clusters that form on their own do so unexpectedly and rapidly due to specific and rare conditions necessary to exist simultaneously in one geographic area. The phenomenon of businesses from the same industry grouping together in the form of a business cluster, known as the cluster effect, has many causes of formation. The main cluster factors that drive formation and perpetuation are resource dependence and integration of the four key players in a human capital-intensive industry located in an area that provides access to the right kind of human capital. The resource dependence and integration cluster factor requires first an awareness of the resources and second a consensus of goals between cluster members. When these conditions exist in an area, clusters begin to form and snowball into major industry epicenters once they reach a critical mass.

In the case of Hollywood, it took less than 5 years after the first movie production company showed up in 1907 for 15 more to relocate there. By 1911, the first studio was built in Hollywood and shortly thereafter, the cluster was in full swing (Edidin, 2005). In 1924, "The Wall Street Journal reported that movies had become the nation's seventh-largest industry, employing 15,000 people in Hollywood alone" (Edidin, 2005). Charles Musser, a professor of film history at Yale, explains:

“There were a number of reasons the movie business moved to Southern California. Weather was certainly one of them. They didn’t have the terrible winter weather of the East. There was no rain and it was much warmer so you could work outside all year” (Edidin, 2005).

Weather was not the only factor influencing relocation. The Motion Picture Patents Company, called the Trust, was created in 1909 in New York by Thomas Edison and “was intended to monopolize the entire [movie production] industry” (Edidin, 2005). The company “possessed most of the available motion-picture patents, especially those of Thomas A Edison, for camera and projection equipment” and also “entered into contract with Eastman Kodak Company, the largest manufacturer of raw film stock, to restrict the supply of film to licensed members of the company” (The Editors of Encyclopaedia Britannica, 2015). Los Angeles’ strategic and geographic distance from New York allowed the movie companies to operate and work there without risk of penalty and interference by the Trust. Because of this challenge that independent movie producers faced, they united against the enemy to destroy the Trust. A consensus of goals, defeating the Trust and operating independently of it, between the independent movie producers was a factor that strengthened the cluster. They eventually succeeded in 1915 when the U.S. Government ordered the Trust “to dissolve for contravening anti-trust laws under the provisions of the Sherman Act” (Silver, 2007). External intervention in the industry by the U.S. government also came in other forms. They “actively assisted Hollywood [in penetrating] foreign markets” as well as provided “government assistance against trade barriers” in international markets (Silver, 2007). Intentional external intervention is one of the cluster factors identified that makes clusters stronger. Hollywood initially formed and functioned independently of external intervention by the US Government, but their eventual involvement made the cluster more likely to succeed. Resource dependence and industry integration can be observed in Hollywood as well. In 1914,

WWI began in Europe and “European studios were unable to continue supplying their home markets and traditional export channels” (Silver, 2007). Consequently, “international demand for Hollywood product escalated” (Silver, 2007). Due to the fierce competition between studios and distributors and other members of the growing cluster, “a wave of merger activity occurred in the American market” (Silver, 2007). These mergers and other strategic alliances that took place increased resource dependence and integration among the four key players, a major factor that leads to the formation of clusters. One notable early alliance came in 1924 when “Warner Brothers invested \$800,000 in sound recording research with the Bell telephone company through their new Vitaphone subsidiary” (Silver, 2007). This alliance created integration of the research community in Hollywood that intensified as time went on. Paramount-Publix, another strategic alliance, “provided extensive training to its managers,” a model that was soon copied by the other major movie production studios (Silver, 2007). The educators and workforce development training organizations were clearly helping to sew the cluster of Hollywood tighter together. There was also extensive collaboration between the investors and entrepreneurs of the clusters in Hollywood from 1912 to 1929 (see Appendix A). The human capital cluster factor can also be observed during the formation of Hollywood. Unlike other industries such as manufacturing where labor is relatively easy to find in any area, the movie making industry requires specific individuals who are highly trained and known for their work. Many of the individuals who contribute to the industry such as actors, directors, producers, and writers have specific human capital tied to their individual names and identities. No one could be Charlie Chaplin except for Charlie Chaplin himself. Movie production is a human capital-intensive industry and due to the fact that Hollywood did reach its critical mass as a cluster, it continues to attract that special human capital to the area today. Industries that are heavily reliant on human capital tend to follow the same patterns that humans do (McRae, 1998). McRae explains,

“Industries cluster because human beings cluster...a certain stability is found in the industries where human capital is the most important element” (McRae, 1998). This unique trait of the industry combined with the unique set of circumstances and pressures within the movie making industry drove the cluster to develop in Hollywood. Resource dependence and integration of the four key players as well as external intervention can be observed in the human capital intensive industry that is Hollywood. The awareness of resources between the companies as well as mutual goals furthered their integration as a cluster. Given that all three of the cluster factors are present in the cluster, Hollywood’s film industry has become nearly unbeatable. The presence of these factors continuing to exist in the industry’s environment will ensure that the industry stays in its current geographic area and that the companies currently operating in the industry will continue to do so within the same industry.

#### **IV. DUMBO incubator**

One interesting example of a business incubator can be seen in New York City's DUMBO neighborhood of Brooklyn. Three founding members created this incubator through the urging from the New York City government. The collaboration between The New York City Economic Development Corporation (NYCEDC), New York University's Polytechnic School of Engineering (NYU-Poly), and Two Trees Management Corporation, caused the development of this incubator in 2011 (NYCEDC, 2015). The NYCEDC provided the seed money, NYU-Poly provided the entrepreneurs and access to many of their school resources, and Two Trees Management provided the real estate at a discounted rate. DUMBO's incubator will be examined for the three cluster factors previously identified to discuss the possibility that the incubator will create a successful business cluster once the incubator initiatives end. The incubator will be examined with the following cluster factors; 1) the four key players of the incubator, 2) human capital aspects, and 3) the external intervention mechanisms.

##### **Four Key Players**

Resource dependence and integration of these four key players is essential for the creation and perpetuation of an incubator-induced business cluster. Without awareness of the resources or a consensus of the players' goals, the incubator-induced business cluster will not develop or remain functioning for an extended period of time. The research community, entrepreneurs and investors, economic developers, and educators and workforce development training organizations must all think and act cohesively toward the creation of an incubator-induced business cluster in order for it to be successful.

##### *Research Community*

Companies that are a part of the DUMBO incubator have access to over twelve different research centers and institutes through NYU-Poly (NYU School of Engineering, 2015). Some of these are the Brooklyn Experimental Media Center, the Center for Advanced Technology in Telecommunications, the Center for Biocatalysis and Bioprocessing of Macromolecules, the Center for Construction Management and Technology, and many more. All of these institutions allow the companies within the incubator to access their technology and research resources that the incubator companies alone did not have. Because of this, the researchers from the incubator businesses are highly reliant on the institutions that provide the information and funding necessary for them to continue innovating. Without NYU-Poly's incredible research infrastructure, these businesses would be lacking an essential element that is needed in any technology company. Jeff Soto, the founder and executive director of TENDIGI, which was the first company to graduate from the DUMBO incubator, stated, "The DUMBO incubator was a great stepping stone for TENDIGI. We were able to work with other startups in the incubator on the mobile applications... It was important to be in that space and see other people that [were] growing their companies" (Elkin, 2013; NYU School of Engineering, 2012). Proximity to information and innovation aids the transfer of knowledge and technology to multiple organizations within the incubator. Soto was able to recognize this important benefit of being part of a tight-knit research community. Sharing the same space with other companies allows the incubator businesses to stay very aware of the changes in the field as they happen. New technological developments and information flow freely which causes the companies and institutions supporting the incubator to become more dependent on one another. One theory argues that "when the knowledge base of an industry is both complex and expanding and the sources of expertise are widely dispersed, the locus of innovation will be found in networks of learning, rather than in individual firms" (Powell, Koput, & Smith-Doerr, 1996). This makes the

research institutions a critical part of making the DUMBO incubator a viable competitor against the Silicon Valley technology cluster that has attracted resources from other areas to join its own network. NYU-Poly's Acting President and Provost, Katepalli Sreenivasan made the point that NYU's "incubators encourage [NYU-Poly's graduates] to stay in New York City instead of taking their talent to Silicon Valley" (NYU School of Engineering, 2012). Resource integration prevents this by creating an alternatively attractive and supportive location for innovative technology companies to operate. The research community's integration with the other three key players makes it more likely that the DUMBO incubator will create a business cluster. However, if there is a lack of innovation and research in this geographic area, the cluster may be threatened.

#### *Entrepreneurs and Investors*

As one of the key players of creating a cluster, entrepreneurs and investors share the job of turning the research community's technological innovations into viable and promising businesses (Walshok, 2009). Entrepreneurs within the DUMBO incubator become resource dependent on the network for information, financial assistance, mentoring, and many other factors, but may not share in the same overall economic goals that the other key players have. On the other hand, investors do *not* become wholly dependent on the network but still may benefit from the business opportunities that it offers. Entrepreneurs and investors are typically more interested in their individual success than the overall success of a local economy. Although the success of a local economy would also benefit the entrepreneurs and investors of that same area, their main concern is their individual prosperity. This divergence of goals may become a problem during the creation or perpetuation of a cluster because these key players may decide to relocate to a new area that provides more of the resources that they need. Investors have the least amount of integration into a cluster because they do not have to limit themselves to one industry,

and often avoid doing so in order to diversify their risks. This is true for technology entrepreneurs as well, but there are higher conversion costs for entrepreneurs to switch industries than there are for investors. Out of the four key players, entrepreneurs and investors are the least integrated members. DUMBO combats these issues by making the area more attractive financially and by providing customized support to each of the incubator businesses when needed. However, unless entrepreneurs and investors are encouraged or incentivized to act for the greater good rather than in self-interest, their lack of integration with the other key players is a threat to the successful establishment and maintenance of a technology cluster in DUMBO.

### *Economic Developers*

The key economic developer in the creation of the DUMBO incubator is the NYCEDC. The NYCEDC is a not-for-profit corporation that was “formed in 2012 as a result of the merger of New York City Economic Development Corporation into New York City Economic Growth Corporation” (NYCEDC, 2015). With a mission “to encourage growth throughout the five boroughs of New York City by strengthening the City’s competitive position and facilitating investments that build capacity, create jobs, generate economic opportunity, and improve the quality of life,” the NYCEDC has initiated incubators, workspaces, workforce programs, and many other types of assistance that all contribute to this mission. Having existed with many different names since the 1960’s, the NYCEDC is the result of mergers of corporations and City agencies and is dedicated to the overall economic improvement of New York City (NYCEDC, 2015). The DUMBO incubator is just one of their many projects. Since 2011, this incubator has been dedicated to the creation of a technology cluster industry in Brooklyn. To initially fund the incubator, the NYCEDC “provided a \$250,000 grant” (NYCEDC, 2015). Since then, the NYCEDC has been responsible for providing the incubator businesses with “access to markets

and customers through its close working relationships with several valuable NYC-based organizations” (NYU School of Engineering, 2015). These organizations include the New York City Investment Fund, Manhattan Chamber of Commerce, Brooklyn Chamber of Commerce, Brooklyn economic Development Corporation, and many others (NYU School of Engineering, 2015). All of these organizations exist to strengthen the New York City economy. Economic developers of an incubator-induced business cluster must “focus on and use resource allocation and business policies that can assure economic prosperity” (Walshok, 2009). However, the NYCEDC has acted as more of a onetime angel investor that has had little direct involvement in the incubator since its founding. Although they do provide access to a network of incubators and co-working spaces, NYU-Poly is more responsible for the direct operations of the DUMBO incubator (NYCEDC, 2015). The lack of tight integration of the economic developers in the day to day operations of this project could be a challenge for the successful establishment of a long-term technology cluster in DUMBO. If the economic developers were more involved in the running of the incubator, then this threat could be eliminated.

#### *Educators and Workforce Development Training Organizations*

NYU-Poly provides the education and training that the incubator needs (NYU School of Engineering, 2015). Its graduates are the ones that are creating the businesses in their incubators and the training and support continues throughout the incubation process. It is the job of the educators and workforce development training organizations to utilize the human capital in the area to aid the incubator. DUMBO’s incubator businesses “gain unique access to the 4,500 engineering, science, technology, and management students at the School of Engineering, and the 40,000 students at NYU” (NYU School of Engineering, 2015). The incubator also provides “expert talent in specific technical and business development areas” (NYU School of

Engineering, 2015). With access to many of this educational institution's resources, the entrepreneurs, research community, and economic developers are well integrated with the educators and workforce development training organizations. NYU-Poly's importance for the economy of NYC makes it more integrated with the economic developers whose interest is in the economic success of the city. The economic developers become dependent on NYU-Poly's ability to create incubators with their resources. NYU-Poly is dedicated to creating high-quality human capital for the use of the surrounding economy but only so that it may attract more students for the purpose of making itself more important as an institution. This educator and workforce development training organization does have goals that align with those of the economic developers and the research community, but for different reasons. Eventually this difference may cause conflict between the key players, which could also be a threat to the cluster. If NYU-Poly is not given more incentive from the NYCEDC and other economic developers to make their dedication to creating an incubator-induced business cluster stronger, the this goal may never be realized.

### Human Capital

In business incubators, there are two important aspects of human capital that must be present in order for the incubator to create a cluster. First, the incubator must focus on developing a human capital-intensive industry. Second, there must be the right type of human capital available in the geographic area surrounding the incubator. Human capital strengthens clusters because humans are unlikely to relocate en masse. The statement "industries cluster because human beings cluster" applies especially in industries that are human capital-intensive (McRae, 1998). Clusters that develop around a human capital-intensive industry rarely move to other geographic areas once they have reached a critical mass because the cluster becomes

attractive for most of the people in the industry. For example, in Hollywood's film industry, as more and more members relocated to California, more and more were attracted there. This was due to the large network of institutions that created films and the actors and actresses that were needed to make the films. Like the film industry, the technology industry requires highly trained individuals who specialize in certain areas. The more human capital-intensive an industry is, the more likely it is the industry will develop into a cluster. Although not as human capital-intensive as the film industry, the technology industry still requires quite a high level of training and specialization. This factor means that a technology cluster is more likely to stay in one place. However, the DUMBO incubator-induced business cluster faces an interesting challenge from Silicon Valley. Because Silicon Valley has reached its critical mass as a cluster, it will be very difficult to dislodge and is also likely to attract human capital from NYC to that location (McRae, 1998). Before the NYC incubator, there was little reason for technology industry players to stay in NYC. Most of them ended up moving to Silicon Valley but now, with the creation of the incubator, have more of a reason to stay. Keeping human capital local was an explicit goal for creating the incubator-induced business cluster in NYC (NYU School of Engineering, 2012). Although the incubator does keep some of the individuals with large human capital in the technology industry in NYC, many more are still relocating to Silicon Valley (NYU School of Engineering, 2012). Given that individuals in the technology industry are attracted to Silicon Valley over NYC at the moment, this presents a unique challenge for this incubator-induced business cluster. If the human capital needed to sustain the cluster moves across the country to join Silicon Valley, this would collapse the cluster in DUMBO. This is an incredibly important threat that the key players need to be aware of and watch very closely when deciding which incentives to provide to entrepreneurs and employees of the incubator industry.

### External Intervention Mechanisms

By definition, business incubators *are* external intervention mechanisms. Government initiatives to make a NYC an economically stronger area have led to the establishment of policies, investments, and economic incentives to keep the cluster together. This incubator receives many benefits including but not limited to reduced real estate taxes, relocation assistance, energy discounts, capital investment tax discounts, and more (NYU School of Engineering, 2015). These initiatives are specifically aimed at creating a cluster. According to the system change model, clusters are more likely to develop when they are encouraged by a myriad of institutions to do so (van de Ven, 1976). Support from public and private institutions makes it more likely for an incubator-induced business incubator to develop. For example, the government anti-trust intervention that broke up Thomas Edison's Motion Picture Patents Company allowed Hollywood to flourish. External intervention mechanisms are designed to protect industries and local economies. This element is an inherent trait of incubators but does not alone absolutely guarantee the successful formation of a business cluster.

## V. Conclusion

Creating the conditions under which clusters are developed is not an easy task. Governments of municipalities wishing to create clusters in their cities must be aware of the conditions that are needed and ensure that the cluster receives intense support. Resource dependence and integration of the four key players, human capital aspects, and external intervention mechanisms must be present. Without these essential cluster factors, it is very unlikely that a cluster can be developed or sustained in a certain geographic location. NYC's attempt to create an incubator-induced business cluster in DUMBO, whether successful or unsuccessful, can be used as a model for municipalities with similar goals in the future. Learning from the success or failure of this project can open new doors for planned economic growth.

At the moment, DUMBO's incubator faces many challenges. Lack of awareness of resources between the four key players, slight dissent concerning the goals of each of the institutions, internal conflict of needs, and competition from Silicon Valley's much larger cluster are major threats to this cluster's well-being. Further integration of the key players to create a larger support network and growing human capital that is likely to stay local are challenges as well. The landscape of the technology industry is constantly changing. The institutions and players that are a part of this incubator will need to navigate this landscape while simultaneously making themselves a stronger cluster. If they are able to accomplish this goal, they may one day reach a critical mass that independently attracts more individuals and resources from the technology industry than Silicon Valley.

## Incubator-Induced Business Clusters: A Case Study

### Appendix A- Leading Hollywood film studios 1912-1929

Founded	Name of film company	Merger, acquisition, Partnership, J.V.	Parties / companies involved	Financial backing	Success or Failure
1912	Universal	Merger to create studio - distributor Formed by Carl Laemmle	IMP, Pat Powers, Rex, NYMP /101 Bison, Nestor, Champion, Centaur, Eclair <u>Distributed films for:</u> Joker, Itala, Victor, Sterling, Crystal, Gem, Ambrosia, L-KO, Republic, Frontier, Gold Seal.	Initially self-financed  Shields & Co. investment bank financed theatre expansion in 1924 (Conant in MacCann 1987 p. 180)	Major studio from 1912  Initially the market leader until early-1920s Highly profitable until 1930s 1933 Sold theatres in receivership
1912	Mutual Film	Independent distribution combine formed by Harry Aitken	<u>Distributed films:</u> Thanhauser, Lux, Gaumont, Eclair, American, Great Northern, Sloax, Reliance, Comet, Majestic, NYMP, Kay-bee, Broncho, Domino, Keystone, Continental	\$2.5 million Wall Street backing from Kuhn, Loeb Bakker 2003 pp 43  Slide 1998 p. 137	Failed - 1919
1912	Famous Players	Studio formed by Adolph Zukor	-	Self-financed and distribution advances	Successful independent studio
1913	Jesse L. Lasky	Studio formed by Jesse Lasky	-	Self-financed and distribution advances	Successful independent studio
1914	Paramount Pictures Corp.	Distributor formed by W.W. Hodkinson	<u>Distributed films:</u> Famous Players Jesse L. Lasky Oliver Morosco Pallas/Bosworth		Major U.S. distributor
1914	World Film	Merger to create Major studio and distribution network	World Special Films Corp. Schubert Theatrical	\$3 million from Wall Street. Slide 1998 p. 235	Market challenger to Paramount from 1915-16. Failed - 1919
1914	Fox Film	-	Film companies owned by William Fox and backed by N.Y. investors	N.Y. investor group led by John F. Dryden President - Prudential Life invested in Fox Film (Conant in MacCann 1987 p. 180)	Major studio from 1914
1915	Triangle Films	Joint venture film studio	Harry Aitken Mack Sennett Thomas Ince D.W. Griffith	\$5 million Slide 1998 p 209	Failed - 1919
1916	Triangle Distribution	Joint Venture distribution company 22 film exchanges	Triangle Films Superpictures <u>Distributed</u> Superpictures Triangle Kay-Bee Keystone	\$9 million company float Bakker 2003 pp 38	Failed 1917
1916	Superpictures	-	W.W. Hodkinson	\$9 million	Failed 1917
1915	Metro Pictures Corp	JV producer-distributor	<u>Distributed films:</u> Dyreda, Popular Plays, Rolfe, Quality, Columbia	Self financed Bank loans.	Initial success. 1920 acquired by Loews Inc
1916	Goldwyn Pictures	Independent film studio Acquired 30 theatres in 1921	Samuel Goldwyn	Bank loans. Commercial National Bank. Berg 1989 p. 114 Duponts and Chase National on Goldwyn board (Conant in MacCann 1987 p. 180)	1924 acquired by Loews Inc
1917	Famous Players-Lasky-Paramount Inc.	Merger or Joint Venture formed in 1917 producer-distributor then vertically integrated into exhibition	Famous Players Jesse L. Lasky Paramount	Public company. \$10 million preferred stock issue from Kuhn Loeb on Wall Street to buy build theatres Bakker 2003 pp 37-38	Dominant market leader and Major studio after 1917

## Incubator-Induced Business Clusters: A Case Study

Founded	Name of film company	Merger, acquisition, Partnership, J.V.	Parties / companies involved	Financial backing	Success or Failure
1917	First National	Joint-venture film booking combine and film studio	Numerous theatre circuits and independent theatre owners	Self-financed by exhibitors. Bank of America loan. Goldman Sachs (Bakker 2003 pp 38.) Float issue of preferred shares by Hayden Stone & Co. (Conant in MacCann 1987 p. 180)	Initial success undermined by Paramount. Failed. Acquired by Warner Brothers in 1925.
1919	United Artists	Joint venture distribution company	Mary Pickford Douglas Fairbanks Charles Chaplin D.W. Griffith	Private company. Self-financed. Bank loans.	Major independent distributor after 1919
1923	Warner Brothers	Independent producer-distributor	Family company	Line of credit from Goldman Sachs Spelling-Warner & Millner 1994 pp 79	Became a Major studio in 1927-29
1924	Loews-M.G.M.	Merger producer-distributor-exhibitor	Loews Theatres Metro Pictures Goldwyn Pictures L.B. Mayer Pictures	Loews Inc. Public company - equity stocks. General Motors and Liberty National Bank on the board. (Conant in MacCann 1987 p. 180)	Major studio from 1924
1924	Columbia Pictures	Formed as a producer-distributor	C.B.C. Sales Corporation -Cohns & Brandt	Bank loans. Poverty row studio.	
1929	R.K.O.	Merger to create producer-distributor-exhibitor	R.C.A. F.B.O. K.A.O. Keith-Albee-Orpheum theatres	Merrill Lynch / RCA Bakker 2003 pp 38	Major studio from 1929-1946.

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